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ABSTRACT

This paper explores cases of three classes that implemented online teaching and learning technologies as part of a university-wide faculty development grant program. Students' satisfaction with key components of the learning experiences was examined. Instruments included students' pre-assessments and post assessments; an instructors' post survey; course syllabi; grant proposals; and instructors' end of grant reports. The paper presents implications for campus wide implementation of online teaching and learning technologies. A model for implementing innovative technologies campus wide is included in the discussion. The seven steps of an Online Teaching Support Model are outlined: planning and preparation; funding; instructional design and training; instructional materials development and testing; implementation; evaluation; and dissemination. Ten tables present findings. Based on findings, it appears clear that, in all three courses, students were satisfied with the connections made between the objective of the course and the assessment used. This would imply that the courses were relatively well designed. However, though the courses were relatively well received, it appears that improvement could have been made in the effective use of online technologies. (Contains 10 references.) (Author/AEF)

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Critical Examination of the Use of Online Technologies in Diverse Courses at a Large Comprehensive University

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Abstract

We explore cases of three classes that implemented online teaching / learning technologies as part of a university wide faculty development grant program. We examined students' satisfaction with key components of the learning experience. Instruments included students' pre-assessments and post assessments, an instructors' post survey, course syllabi, grant proposals, and instructors' end of grant reports. We present implications for campus wide implementation of online teaching/ learning technologies. We include discussion of a model for implementing innovative technologies campus wide (online teaching support model).

Background

In 1997, faculty interest in online teaching at California State University San Bernardino (CSUSB) started increasing. By 1999, the number of faculty who wanted to do online teaching had grown significantly. Faculty faced many questions and issues as they embarked to do online teaching. The Teaching Resource Center (TRC), the faculty development unit that support teaching and innovative instruction, also faced the task of helping in faculty's new role as online teachers.

To address these needs, TRC drew upon instructional design and evaluation models (Van Slyke, Kittner & Belanger, 1998; Belanger & Jordan, 2000; Dick & Carey, 1996; Salisbury, 1996; Seels & Glasgow, 1998) and identified the major steps involved in course development as applied to online teaching. TRC developed a systematic and holistic plan that serves both as the map and the glue that holds the various phases and players together (Santiago, 2001). This systematic plan has 7 major steps:

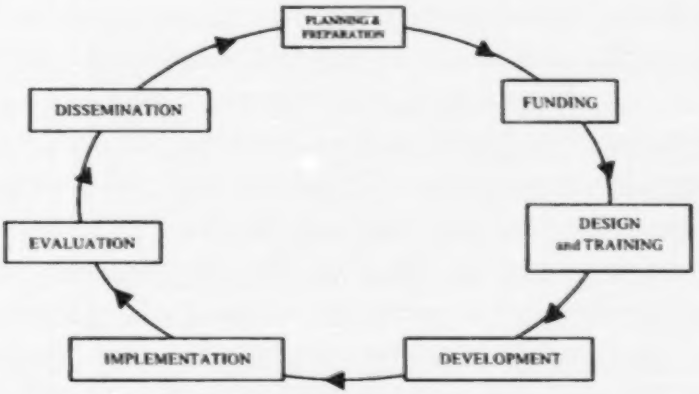

Figure 1. Online Teaching Support Model: 7 Major Steps

Planning and Preparation. The instructor studies the big picture and the instructional and non-instructional issues that will have an impact on successful online teaching. Addressing issues up front gives a good estimate of how much time and effort need to be invested, and helps determine one's readiness for online teaching.

Funding. Faculty are encouraged to seek funding through grant programs that lead to a course buyout, money for resources and/or hire a student assistant

Instructional Design and Training: Designing lessons for online teaching is not simply converting existing materials into digitized format. Skills and training for goal analysis, task analysis, assessment, instructional materials development, and the use of hardware and software are addressed in this step.

Instructional Materials Development and Testing. This step involves developing instructional materials, testing them, and making sure that they can be delivered successfully online, and that users will be able to access them with minimal, if not totally free of instructional and technological glitches.

Implementation. The course is actually taught online. The instructional design is put into action, the instructional materials are used, and technology is relied upon to deliver instruction, all towards the achievement of learning goals.

Evaluation. Evaluation identifies the strengths and weaknesses of the instructional design, of instructional materials, and delivery medium. Most importantly, it measures the extent to which goals were met.
Dissemination. Innovation and change that is well planned and appropriately evaluated also results in lessons learned and quality products. When reported to a professional community, this leads to further validation, peer evaluation, and replication, which then leads to scholarship of teaching (Hutchings and Schulman, 1999).

Description of Grant Program

To support online teaching, TRC sponsors the Web-based Course Development Grant program that awards summer stipend ($5,000) to faculty. The course redesign or development could range from using a significant combination of online features as teaching enhancement, or to deliver the whole course online. When first offered in 1999, 12 faculty proposals were funded. The Course Development Grant Program was funded by the Office of the Provost. Administrative support for online teaching also resulted in student support through the Student Technology Support Center, the establishment of an Office for Distributed Learning and the hiring of a librarian to support distance courses.

Analysis of the Efficacy of the Grant Program

To inform our analysis of the efficacy of the online components of the courses, we utilized a variety of assessment tools including pre and post surveys of students, a post survey of faculty, and an analysis of course syllabi, grant proposals and final reports.

Comparison data from the three classes in which we had sufficient data from both the student pretest and posttest are listed below. We report results from a comparison of the uses of online technologies in the three courses. We examined student data (pretest and posttest), faculty data (free response and multiple choice questions), course syllabi, and the course development proposal. Our intention was to utilize triangulation in an attempt to ascertain factors that led to successful and efficacious uses of online technologies from both the faculty and the student perspectives.

Three classes that were offered in the 1999-2000 academic year were examined. The description of each course is listed as it appeared in the course syllabi and/or the catalog of programs:

1. English as a Second Language (EESL) – Research in English as a Second Language: Covers various perspectives used to guide research in TESOL. Includes analysis, discussion, reflection and writing about key issues and concepts in research. Students will design and carry out literature review working towards a theoretical framework to gain foundation as expert practitioner or future researcher.
2. Criminal Justice (CJUS) – Research Methods in Criminal Justice: Introduction to scientific methodology and research designs used to conduct basic and applied research in the criminal justice field. Emphasis on scientific operationalization, survey methodology, and concepts of evaluation design.
3. Information Sciences (INFO) – Decision Support Systems: Formal information systems that support organizational decision-making. Topics include the strategy, framework, design, implementation and evaluation of decision support systems. Students will create and apply decision support systems to planning, coordinating, organizing, controlling and/or directing tasks.

Pre-Survey

In the student pre survey, we obtained data on three categories: student demographics, student background, and student experience on the use of technology. A summary of demographic data for 61 students who took the pretest in the 3 classes is listed below.

Table 1. Student Demographics

Demographics		CJUS	EESL	INFO
Level	Graduate	3%	91%	5%
	Senior	40%		90%
	Junior	47%		5%
Degree sought	Masters	10%	100%	15%
	Bachelors	90%		75%
Age	40's & 50's		27%	20%
	30's	7%	45%	15%
	20's	87%	27%	65%
Gender	Male	43%	18%	45%
	Female	53%	82%	55%
Miles from campus	> 50 mi.	10%	18%	5%
	40-49 mi.	3%	9%	10%
	30-39 mi.	17%	0%	20%
	20-29 mi.	17%	9%	5%
	10-19 mi.	20%	0%	15%
	< 9 mi.	27%	55%	40%

Table 2. Student Background

Background		CJSU	EESL	INFO
Reason for taking course	Recommended	27%	9%	25%
	Required	83%	100%	70%
	Interesting	17%	18%	30%
	Fits schedule	37%	18%	60%
Hours to spend on course	>= 17 hrs	3%	36%	0%
	13-16 hrs	3%	9%	0%
	9-12 hrs	23%	36%	10%
	5-8 hrs	57%	18%	75%
	0-4 hrs	13%	0%	15%
Same instructor before	Yes	37%	73%	10%

As shown above, the majority of the students were in upper division working for a bachelor's degree except for the Education masters students (EESL). Most of the students were in their 20's and 30's. Female students were in the majority, especially in the Education course. Almost half of the students live close to campus (< 9 miles) except for the CJUS students who are distributed in various distances from campus.

For background data, we surveyed students' reasons for taking the course, the number of hours that they intended to spend on the course per week, and whether they have had the instructor before. Data from this component of the survey is listed below.

In general, students were taking the course because it was required. A secondary reason was that it fits their schedule. The majority of the undergraduate students planned to spend 5-12 hours per week on the course, with graduate students planning to spend more than 17 hours per week on their course. Most of these graduate students have had a course with the instructor before.

We also surveyed students' use of and comfort level with online technologies. A summary of students' use of technology is given below:

Table 3. Student Use of Technology

Use of technology		CJUS	EESL	INFO
Access at home	Computer	93%	91%	100%
	Internet	87%	91%	90%
Used in previous course	Online syllabus	47%	73%	40%
	Online Lectures	33%	73%	30%
	Online Tests	7%	82%	20%
	Online Research	70%	91%	80%
	Online Discussion	10%	36%	20%
	Email	77%	91%	80%
	Chat Rooms	23%	9%	25%
Comfort level (5=highest)	Using computers	4.3	4.0	4.8
	Using internet	4.3	3.9	4.7
	Using Chat Rooms	3.2	3.4	4.1
	Using Email	4.1	4.6	4.6
	Taking Online Course	3.2	3.8	3.6
	Joining Online Discussion	2.8	3.5	3.7

Based on the data, student access to computers and Internet at home is very high (87-100%). Of the three groups, the graduate students had the most experience in the use of online technology in a course. Online experience is high for research and email use in all three courses. Students are most comfortable in the use of computers, Internet and email.

Post-Survey

In the student post survey we coupled the internally developed and tested Student Evaluation of Learning Effectiveness (or SELE, a self report measure of learning that utilized a 5 point Likert scale and which had been approved for use in evaluation of teaching by the Faculty Senate), with a self-report instrument concerning technology use in the course.

One particularly striking result involves the post survey item concerning how well the online learning experiences fostered interaction and teamwork among class members. In INFO, this was unmistakably the most highly rated item (mean = 4.5 of 5). In the other two courses, EESL and CJUS, this was clearly the lowest rated item (mean = 3.1 of 5, mean = 2.9 of 5, respectively). In comparing scores of both EESL and CJUS with INFO, two tailed t-tests indicated significance with $p < .01$.

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Table 4. Online Components of Course Fostered Interaction and Teamwork

Course fostered interaction and teamwork		CJUS	EESL	INFO
	5=Excellent	29%	18%	59%
	4=Very Good	0%	9%	35%
	3=Satisfactory	21%	45%	6%
	2=Poor	29%	18%	0%
	1=N/A	21%	9%	0%
	Mean	2.9	3.1	4.5

We found the highest mean posttest scores in the answers to three questions that related to the structure of the courses and to the involvement of the teacher in the learning process.

Table 5. Satisfaction With Course Items Controlled by Instructor

		CJUS	EESL	INFO
Matched objectives with assessment	5 = Excellent	50%	27%	41%
	4 = Very Good	36%	36%	47%
	3 = Satisfactory	7%	36%	12%
	2 = Poor	0%	0%	0%
	1 = N/A	7%	0%	0%
	Mean	4.2	3.9	4.3
Utilized clear grading criteria	5 = Excellent	43%	55%	47%
	4 = Very Good	36%	0%	41%
	3 = Satisfactory	14%	27%	12%
	2 = Poor	0%	18%	0%
	1 = N/A	7%	0%	0%
	Mean	4.1	3.9	4.4
Instructor contributed to learning	5 = Excellent	43%	36%	35%
	4 = Very Good	50%	36%	53%
	3 = Satisfactory	0%	27%	12%
	2 = Poor	0%	0%	0%
	1 = N/A	7%	0%	0%
	Mean	4.2	4.1	4.2

Table 6. Did Online Components Foster Discussion on Multicultural and Diversity Issues?

Fostered discussion on multicultural and diversity issues

	CJUS	EESL	INFO
5 = Excellent	29%	27%	18%
4 = Very Good	14%	18%	35%
3 = Satisfactory	21%	36%	29%
2 = Poor	14%	18%	18%
1 = N/A	21%	0%	0%

To the question: "The course matched objectives with assessment", the mean for CJUS was 4.2, for EESL, it was 3.9, and for INFO, it was 4.3. "Utilizing clear grading criteria was also rated high by all three courses, with INFO mean at 4.4, CJUS at 4.1 and EESL at 3.9. All three courses had almost the same means for the question "Instructor contributed to learning" (CJUS = 4.2, EESL = 4.1, INFO = 4.2). In tandem, this data would be an indicator of clear grading criteria that connected with stated objectives of the courses.

The lowest means reflected responses to whether the online components of the course "Fostered discussion on multicultural and diversity issues".

When it came to identifying who contributed to the learning experience, the instructor was ranked highest, based on the mean scores. EESL ranked "self" equally with the instructor, while CJUS ranked "self" as second and other students as lowest. Interestingly, concerning who contributed to their learning, INFO ranked "Other student/s" equally with the instructor. For both CJUS and EESL this was the lowest rated item of the three.

Table 7. Rating For How Well the Instructor, the Student, and Other Students Contributed to the Learning Experience

Contributed to learning experience	CJUS	EESL	INFO
Instructor	4.2	4.1	4.2
Self	3.6	4.0	4.0
Other Student/s	3.4	3.5	4.2

We also surveyed how satisfied students were with online course materials. Satisfaction was rated high by all three courses. However, when asked if on line materials helped facilitate learning, means for all three courses were low.

Table 8. Online materials survey results

	CJUS	EESL	INFO
Satisfied with online materials	4.7	4.1	4.2
Online materials facilitated learning	2.3	3.4	3.5

For all 3 courses examined, online materials were reported to have saved students time. However, in the EESL class, students reported spending more time on the online tests but saving time through use of discussion board.

Table 9: Time Spent/Saved Using Online Components

Time Spent				
Online Materials		CJUS	EESL	INFO
	Saved time	36%	64%	69%
	Spent more time	0%	9%	6%
	No answer	64%	27%	13%
Online Tests				
	Saved time	0%	27%	0%
	Spent more time	0%	55%	0%
	No answer	100%	27%	100%
Discussion Board				
	Saved time	7%	64%	0%
	Spent more time	0%	9%	0%
	No answer	93%	27%	100%

Faculty Syllabi, Proposals, Grant Reports, and Post Surveys

The faculty post survey was composed of items concerning their needs and uses of online technologies, coupled with an evaluation of students' learning that paralleled the student post survey. We also examined how the use of online technologies impacted faculty workload.

In our ongoing analysis we are considering the factors that led to successful and efficacious use of online technologies for both faculty and students. We are currently conducting our analysis via triangulation where we compare student data, faculty data (composed of free response and multiple choice questions), information provided in the course syllabi, the grant proposals, and the end of grant reports.

We were not able to directly correlate the faculty post data with the student post data for individual courses due to the anonymity of the faculty post surveys. However, we were able to glean some data in the aggregate for professors' general satisfaction with the use of online technologies in their classes. Based on that data it was clear that faculty appreciated the support that was given to them.

Two of the three instructors provided access to syllabus information. Based on this information, in the INFO class, students were required to work in teams to complete projects. The professor used online materials but did not list use of the discussion board in his syllabus. By contrast, in the EESL class, students were not required to work in teams. The instructor required the use of the discussion board, online materials and online tests.

Table 10: Online components of Course Design

COURSE DESIGN	Based on Proposal:			Based on syllabus:			Based on final report:		
	CJUS	EESL615 EESL	INFO	CJUS	EESL	INFO	CJUS	EESL	INFO
Online Materials	All course notes, exercises	Information modules/ tutorials using PowerPoint and audio	Course content, glossary, site links for articles		Assignment descriptions			Course materials	Course content
Online Tests	Practice quizzes, assessment	Part of tutorial	Online quizzes and surveys		100-point quiz set, review quizzes			Quizzes	
Online Research					Accessing TESOL research via technology				

Online Discussion Email Chat Rooms	Mentioned in the justification but not part of project description		Mentioned it affords students to interact but was not reported to have been done
Bulletin board		Weekly announcements	Used extensively

In the grant proposals, teaching was to be enhanced with the posting of online materials and links to relevant websites (see figure 10). EESL also incorporated the use of online tests and discussion board. INFO proposed to implement more technologies than were actually incorporated into the course.

Discussion

Based on the data presented above, it appears clear that in all three courses, students were satisfied with the connections made between the objectives of the course and the assessments used. This would imply that the courses were relatively well designed.

However, though the courses were relatively well received, it appears that improvements could have been made in the effective use of online technologies. For instance, the INFO course did not, according to the syllabus, the final report and the students' post surveys, use a discussion board for collaboration and file sharing. This was the case even though extensive collaboration was necessary for successful completion of course projects and even though at least 40% of the students lived 20 or more miles from campus.

Myer (2001) indicated that a fundamental problem with much research on online instruction is that it has failed to disaggregate the effects of the instructional design from the effects attributable to the technology. This appears to be the case in the courses that we examined above, as each could be shown to have been efficacious (based on student post survey data).

It is striking that two of the three courses did not reflect good scores on online learning activities fostering interaction and teamwork. This is striking as online technologies such as threaded discussion boards and chat rooms can be very powerful tools for collaboration (see Jonassen, et al., 1999). This would suggest that the full power of the technologies available through the WebCT tools to the instructors had not been utilized. In the third course, the INFO course, it is not clear whether chat rooms were utilized by students (see table 10). However, the structure of the course required extensive collaboration on projects (according to the course syllabus).

Similarly, for all three classes, the mean scores on facilitating discussions concerning diversity were low. Online technologies have the potential to enable ready access to global perspectives (see Papert, 1998), yet it would appear that this characteristic of the technology was not utilized effectively.

The fact that students in all three classes generally believed that using online technologies saved time would suggest improved instructional efficiency for all classes. With a population composed of commuters, who often hold full time jobs, this result is weighty.

Though we asked students to rate how well the online learning experiences (using 5=excellent; 4=very good; 3=satisfactory; 2=poor; 1=not applicable), contributed to the effectiveness of the class (as measured by multiple items detailed in the above tables of results), respondents may not have read the items with respect to online technologies but rather with respect to the entire class. For instance, in the INFO class, students identified online components of the class to have contributed to fostering interaction and teamwork, yet a discussion board was not utilized in the course, according to the proposal, the syllabus, the final report, and student post surveys. We are also concerned that in some cases, students may not have understood the terms used and may have therefore answered questions erroneously (e.g. some students rated discussion boards and chat rooms that did not appear to have been implemented in a particular course).

Given our data analysis, several implications are suggested for implementation of the Online Teaching Support Model at our university. In examining the 7 components of the model, there is evidence that several of the components may require substantial additional support. Specifically, the instructional design and training area may need additional attention to enable faculty to best integrate online technologies into their course design. We are concerned that our evidence suggests that instructors may not use the most powerful or appropriate technologies to assist with learning outcomes for their class or that they may use technologies in ways that are not effective. Additionally, in the evaluation area, several flaws were present. Faculty did not administer the instruments consistently in their courses (even though evaluation was a critical component of the grant). Thus, of the twelve funded projects, we were able to realize comparison data from only three classes in which we had sufficient data from both the student pretest and posttest.

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We surmise that, in general, there is a tendency for faculty to focus on innovation and on technology and not on evaluation of the online course components. In order to better collect data from faculty, and to encourage them to have students participate fully in pretest and posttest administration, additional faculty incentives and reminders are likely to be necessary. Engaging faculty in a post-course interview would also likely assist analysis of the efficacy of the online course components.

We will apply the lessons learned from this analysis to future faculty development grant projects. This will assist us in serving the educational needs of our students through the use of technologies that can bridge barriers to access. We believe that the Online Teaching Support Model can be effectively applied at other institutions that would internally fund faculty development efforts. Based on our experience, special attention should be applied to the instructional design and evaluative components of such efforts.

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